

REMARKS

Claims 1 and 4-16 remain in this application. Claims 2-3 have been canceled and claims 17-33 have been withdrawn. Claim 1 is currently amended. No new matter has been added. In view of the Examiner's earlier restriction requirement, Applicant retains the right to present claims 17-33 in a divisional application.

In this Response, Applicant amends claims without prejudice and addresses the Examiner's rejections. Support for the amendments to the claims can be found throughout the application. Amendments to the claims are being made solely to expedite prosecution and do not constitute an acquiescence to any of the Examiner's rejections. Applicant's silence with regard to the Examiner's rejections of the dependent claims constitutes a recognition by the Applicant that the rejections are moot based on Applicant's remarks relative to the independent claim from which the dependent claims depend.

I. Claim Rejections Under 35 U.S.C. § 112 ¶ 2

Claims 1-16 were rejected under 35 U.S.C. § 112 ¶ 2 as allegedly being indefinite. Applicant respectfully submits that in view of the current amendment this rejection is moot.

II. Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-16 were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over U.S. Patent Pub. No. 2002/0096680 to Sugano et al. (hereinafter "Sugano") in view of U.S. Patent Pub. No. 2002/0104750 to Ito (hereinafter "Ito") and U.S. Patent No. 5,591,668 to Maegawa et al. (hereinafter "Maegawa"). Applicant respectfully traverses this rejection. Applicant respectfully submits that in view of the current amendment this rejection is moot.

The only independent claim pending, currently amended claim 1, is directed to "a

method for processing a thin film sample, comprising the steps of,” *inter alia*,

(b) masking the at least one beam pulse to produce at least one masked beam pulse, wherein at least one masked beam pulse is used to irradiate at least one portion of the thin film sample;

(c) with the at least one masked beam pulse, irradiating the at least one portion of the film sample with sufficient intensity to completely melt the at least one portion of the thin film sample throughout its thickness; and

(d) allowing the at least one portion of the film sample to crystallize, the crystallized at least one portion being composed of a first area and a second area, wherein, upon the crystallization thereof, the first area includes a first set of grains, and the second area includes a second set of grains whose at least one characteristic is different from at least one characteristic of the first set of grains,

wherein the first area surrounds the second area, and is configured to allow an active region of an electric device to be provided at a distance therefrom and sized such that a shortest width of the first area is at least ten times smaller than a shortest width of the second area.

III. Legal Standard for Obviousness

To reject claims in an application under Section 103, an Examiner must establish a prima facie case of obviousness. Under the Supreme Court’s guidelines enunciated in *Graham v. John Deere*, 383 U.S. 1, 17 (1966), and reaffirmed in *KSR Int’l Co. v. Teleflex Inc.*, 127 S. Ct. 1727 (2007), to establish a prima facie case of obviousness, the Examiner has an obligation to construe the scope of the prior art, identify the differences between the claims and the prior art, and determine the level of skill in the pertinent art at the time of the invention.

Applicant respectfully submits that the Examiner has failed to meet this burden to establish a prima facie case of obviousness for the rejection under 35 U.S.C. § 103(a). The Examiner admits that Sugano “fails to explicitly disclose wherein the first and second areas are sized such that the width of the first area is at least ten times smaller than the width of the second area.” *See* Office Action, p. 4. Thereafter, the Examiner supports his assertion of obviousness based solely on the contention that “it would have been obvious through routine experimentation and optimization to provide the claimed limitation of the relative widths for the purpose of

minimizing or eliminating the edge portions to insure high device performance.” Applicant respectfully submits this rationale is insufficient as a matter of law to support a rejection under 35 U.S.C. § 103(a) for the reasons outlined below.

IV. None of Sugano, Maegawa or Ito Disclose or Suggest All of the Features of Amended Independent Claim 1

A. None of Sugano, Maegawa or Ito Disclose or Suggest “irradiating the at least one portion of the film sample with sufficient intensity to completely melt the at least one portion of the thin film sample throughout its thickness.”

None of Sugano, Maegawa or Ito disclose or suggest at least the feature of “irradiating the at least one portion of the film sample with sufficient intensity to completely melt the at least one portion of the thin film sample throughout its thickness,” as recited in amended independent claim 1.

The Examiner states that Sugano discloses the above feature at paragraphs [0090]-[0093]. *See* Office Action, p. 5. However, Sugano states “[a]t the time of completing the upstand of the laser light pulse, the semiconductor thin film 4B is substantially melted, *but the nuclei K remain as they are.*” Sugano, paragraph [0091] (emphasis added). The “nuclei” of Sugano are in fact small pre-existing crystals that exist within the amorphous silicon prior to irradiation, as opposed to those that appear during actual nucleation, wherein the amorphous silicon is completely melted and new crystal seeds are formed thereafter upon cooling. *See id.* (“The amorphous silicon semiconductor thin film 4B contains micro-nuclei K to be seeds of crystallization.”). Sugano states that the “micro-nuclei” remain after being “substantially” melted. Sugano therefore does not disclose or suggest completely melting the sample because such a process necessarily would destroy those “micro-nuclei.” *See* Sugano, paragraph [0090], Figs. 21B, 21C (showing that “nuclei” K have seeded crystals T as a result of irradiation). This is diametrically opposed to the feature of “irradiating the at least one portion of the film sample

with sufficient intensity to *completely melt* the at least one portion of the thin film sample *throughout its thickness*,” recited in claim 1 (emphasis added). Neither Maegawa nor Ito disclose the above feature and therefore they cannot remedy the deficiencies of Sugano.

Sugano Teaches Away From Completely Melting

Moreover, Sugano teaches away from the claimed configuration in that it is directed to a method for growing a region of ever-larger crystals to allow placement of active regions of electronic devices thereon, a processes that necessarily requires some portion of the thin film sample to remain unmelted. For example, Sugano states that “[t]here is a problem in that when the other part than the ‘boundary part’ is irradiated at optimum energy, the ‘boundary part’ is over-irradiated, in which the semiconductor thin film is *microcrystallized* to deteriorate the performance of the thin film transistor.” Sugano, paragraph [0008] (emphasis added). It has been traditionally been considered undesirable to form the active region on an area that has been fully melted because the it was thought better to form the active region on the areas with the larger crystal sizes. *See id.* For example, Ito states that “there has been a stronger demand for further enlargement of a current crystal particle of the polycrystalline Si film.” Ito, paragraph [0008]. Thus, it would not be obvious to irradiate “at least one portion of the film sample with sufficient intensity to *completely melt* the at least one portion of the thin film sample *throughout its thickness*” and to allow “at least one portion of the film sample to crystallize” such that “the first area surrounds the second area, and is configured to allow an active region of an electric device to be provided at a distance therefrom,” as is claimed in amended independent claim 1.

B. None of Sugano, Maegawa or Ito Disclose or Suggest “wherein the first area surrounds the second area ... sized such that a shortest width of the first area is at least ten times smaller than a shortest width of the second area.”

None of Sugano, Maegawa or Ito disclose or suggest at least the feature of using a

masked beam pulse to irradiate a thin film sample such that there is a first area surrounding a second area and “sized such that a shortest width of the first area is at least ten times smaller than a shortest width of the second area.” In the Office Action the Examiner admitted that Sugano does not disclose or suggest the feature of independent claim 1 that “the first area surrounds the second area, and is . . . sized such that a shortest width of the first area is at least ten times smaller than a shortest width of the second area.” *See* Office Action, p. 4. The Examiner then stated “it would have been obvious through routine experimentation and optimization to provide the claimed limitation of the relative widths for the purpose of minimizing or eliminating the edge portions to insure high device performance.” *Id.* However, Sugano does not disclose or suggest any first area, let alone a first area surrounding a second and “sized such that a shortest width of the first area is at least ten times smaller than a shortest width of the second area.”

As recently stated by the Federal Circuit, “a flexible [teaching, suggestion, or motivation] test remains the primary guarantor against a non-statutory hindsight analysis such as occurred in this case.” *Ortho-McNeil Pharmaceutical, Inc. v. Mylan Laboratories, Inc.*, 520 F.3d 1358, 1364 (Fed. Cir. 2008). Thus, some suggestion to combine the cited references to arrive at the claimed feature is still the best protection against the kind of hindsight claim of obviousness Applicant respectfully submits the Examiner is engaging in. *See In re Rijckaert*, 9 F.3d 1531, 1534 (Fed. Cir. 1993) (“Obviousness cannot be predicated on what is unknown. Such a retrospective view of inherency is not a substitute for some teaching or suggestion supporting an obviousness rejection.” (internal quotations and citations omitted)). As elaborated upon below, none of Sugano, Maegawa or Ito have any of the sort of suggestion that would support the Examiner’s contention.

To support the above rejection, the Examiner states that Sugano discloses the

edge or boundary portions to be problem areas, citing paragraphs 8-10 of Sugano. *See* Office Action, p. 4. However, the “boundary portions” referred to in Sugano are those areas of multiple irradiation that result when a sequential lateral solidification (“SLS”) technique is employed. Sugano addresses this issue by use of a bulk irradiation technique, *i.e.*, using a single, strong laser shot to irradiate the entire region that the thin film transistor will be formed on. *See* Sugano, paragraphs [0008]-[0010], Figs. 1A-1C. Sugano states,

in order to produce a large area LCD panel having a dimension across corners of about 20 inches (about 120 mm x 160 mm) required for a large display, a “boundary part” of laser irradiation is necessarily formed in either method. There is a problem in that when the other part than the “boundary part” is irradiated at optimum energy, the “boundary part” is over-irradiated, in which the semiconductor thin film is microcrystallized to deteriorate the performance of the thin film transistor.

Id. at paragraph [0008]. Thus, Applicant respectfully submits that Sugano does not address the problem of an edge region. Instead it addresses the problem of multiple irradiated regions through the use of bulk irradiation. Moreover, the Examiner has stated that Ito and Maegawa were only “cited to explicitly disclose the grain characteristics of the two different portions.” Office Action, p. 7. Thus, the Examiner has not alleged Ito or Maegawa suggest the feature of independent claim 1 that is missing from all the cited references.

Sugano Teaches Away From The Claimed Configuration

In addition to the above, Sugano cannot be the basis for an obviousness rejection for the further reason that it expressly teaches away from the claimed configuration. Sugano repeatedly stresses the importance of uniformity of the crystallinity of the thin film sample. For example, Sugano states that “by using a laser irradiation apparatus having output that is capable of crystallizing a region having a prescribed area or more at a time, the cross sectional shape of the laser light can be changed and adjusted to the region, in which *uniformity* in device

characteristics is *required* (such as a circuit region).” Sugano, paragraph [0013] (emphasis added). Moreover, “the semiconductor thin film with the region RGN is *uniformly polycrystallized*, so as to obtain uniform device characteristics by forming thin film transistor using the semiconductor thin film as an active layer” Sugano, paragraph [0059] (emphasis added). These are but a few of the numerous examples wherein Sugano emphasizes the importance of complete uniformity in the irradiated region. This clearly teaches away from the claimed configuration of a first area surrounding a second and “sized such that a shortest width of the first area is at least ten times smaller than a shortest width of the second area” as in claim 1. Therefore, Applicant respectfully submits that because Sugano does not disclose any edge region and does not provide any suggestion of masking a beam pulse to reduce the size of the edge region with respect to the center region, and because it teaches away from forming a first area and second area at all, it cannot render the claimed feature of the first area being “sized such that a shortest width of the first area is at least ten times smaller than a shortest width of the second area” obvious through routine experimentation and optimization without the undue use of hindsight.

Neither Maegawa Nor Ito Remedy The Deficiencies Of Sugano

Maegawa cannot repair the deficiencies of Sugano, at least because, while Maegawa does address the edge region problem, it does so in an entirely different manner: disclosing the use of an SLS technique to reduce the effect of the edge region. As stated above, Maegawa does not disclose or suggest the feature of a first area surrounding a second and “sized such that a shortest width of the first area is at least ten times smaller than a shortest width of the second area” as in claim 1. Maegawa also does not provide any motivation or suggestion that would lead a person of ordinary skill in the art to claim the above feature.

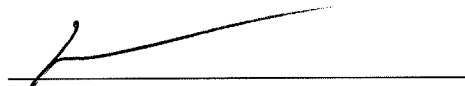
Ito also cannot remedy the deficiencies of Sugano and Maegawa at least because it too does not disclose or suggest that “the first area surrounds the second area, and is . . . sized such that a shortest width of the first area is at least ten times smaller than a shortest width of the second area.” Ito is directed to a method of multiple irradiations using various masks to eliminate the existence of two areas with differing crystalline characteristics by growing the large particle crystals through the micro-crystallized areas. Thus, Ito does not provide any motivation or suggestion to use a masked beam pulse to irradiate a thin film sample such that “the first area surrounds the second area, and is . . . sized such that the width of the first area is at least ten times smaller than the width of the second area.” Indeed, the Examiner has stated that Maegawa and Ito were only cited for showing two areas of differing grain characteristics. *See* Office Action, p. 7.

None of Sugano, Maegawa or Ito disclose the feature of using a masked beam pulse to irradiate a thin film sample such that there is a first area surrounding a second area and “sized such that a shortest width of the first area is at least ten times smaller than a shortest width of the second area.” None of Sugano, Maegawa or Ito contain any teaching, suggestion or motivation for using a masked beam pulse to irradiate a thin film sample such that there is a first area surrounding a second area and “sized such that a shortest width of the first area is at least ten times smaller than a shortest width of the second area.” *See Ortho-McNeil*, 520 F.3d at 1364. Therefore, Applicant respectfully submits that the rejection of amended independent claim 1 under 35 U.S.C. § 103(a) as unpatentable over Sugano in view of Ito and Maegawa should be withdrawn. The rejections of claims 4-16 should also be withdrawn, as claims 4-16 all depend from claim 1, and are therefore patentable over the prior art for at least the same reasons discussed above.

CONCLUSION

Applicant does not believe that any additional fee is required in connection with the submission of this document. However, should any fee be required, or if any overpayment has been made, the Commissioner is hereby authorized to charge any fees, or credit any overpayments made, to Deposit Account 02-4377.

Respectfully submitted,



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